



Impact of Technology on Future Defense

F. L. Fernandez

Report Documentation Page		
Report Date 26032001	Report Type N/A	Dates Covered (from... to) -
Title and Subtitle Impact of Technology on Future Defense	Contract Number	
	Grant Number	
	Program Element Number	
Author(s) Fernandez, F. L.	Project Number	
	Task Number	
	Work Unit Number	
Performing Organization Name(s) and Address(es) DARPA	Performing Organization Report Number	
Sponsoring/Monitoring Agency Name(s) and Address(es) NDIA (National Defense Industrial Association 2111 Wilson Blvd., Ste. 400 Arlington, VA 22201-3061	Sponsor/Monitor's Acronym(s)	
	Sponsor/Monitor's Report Number(s)	
Distribution/Availability Statement Approved for public release, distribution unlimited		
Supplementary Notes Proceedings from National Summit on U.S. Defense Policy: Acquisition, Research, Test and Evaluation, 26-30 March 2001 sponsored by NDIA.		
Abstract		
Subject Terms		
Report Classification unclassified	Classification of this page unclassified	
Classification of Abstract unclassified	Limitation of Abstract UU	
Number of Pages 15		

Outline



- **Describe DARPA and its technology investments**
 - Major focus areas
 - Budget details
 - DARPA process
- **Suggest a major change in overall science and technology investment and management paradigm**

Chain of Command



DARPA Mission



*Change Leader for the Department of
Defense*

- **Solve National-level problems**
- **Enable Operational Dominance**
- **High-Risk, High-Payoff Technology
Development and Exploitation**

DARPA's Role



DARPA

Bottom-up, opportunity, event-driven

Great process flexibility

Integrated research

Radical change

Central DoD agency for R&D

Planned product obsolescence

FY01 funding (\$2.0B) is 22% of all
S&T funding



SERVICE R&D

Top-down, requirement, schedule-driven

Highly formalized processes

6.1 - 6.5 research separated

Reliable, sustainable gains

Support Service mission

Planned product improvement

FY01 funding (\$5.2B) is 57% of all S&T
funding

The DoD requires both radical innovation and
requirements-based R&D

Some Current Focus Areas



		<u>FY 2001</u>
National-Level Problems	<u>292.0</u>	<u>14%</u>
• Protection from Biological Attack		9%
• Protection from Information Attack		5%
Operational Dominance	<u>819.9</u>	<u>41%</u>
• Affordable, Precision Moving Target Kill		7%
– Offensive and defensive		
• Dynamic Command & Control		11%
– Mobile Networks		
– Near-Real-Time Planning, Replanning		
• Future Warfare Concepts		23%
– Hard and Deeply Buried Target Classification		
– Combined Manned, Unmanned Operations		
▪ UCAV (AF, N); FCS (Army)		

Some Current Focus Areas

Continued



FY 2001

High-Risk, High Payoff Technology

Exploitation

784.7

39%

- **Information Systems**
- **Electronic Systems**
- **MEMS**
- **Materials Technology**
- **Beyond Silicon CMOS/Biology Integration**

12%

10%

3%

10%

4%

Other

117.9

6%

Budget Details



- **National-level and high-risk technologies work represents 53% of DARPA's budget for FY01**
- **DARPA's work on national-level problems and high-risk technologies constitutes critical fractions of DoD's total S&T expenditures:**

For example:

- **Chemical/Biological Defense 53%**
- **Information Systems /Technology 43%**
- **Sensors and Electronics 39%**
- **Materials/Processes 30%**
- **41% of DARPA's budget is directly devoted to military operations**

Focus Area Identification



Three strategic areas have been identified:

- National-Level Problems
- Operational Dominance
- Technology Exploitation

Based on technical input, DARPA Management determines the focus areas that DARPA should address.

Sources of expertise include:

Operational Dominance

CINC Recommendations

Individual Svc Leadership

Defense Science Board

Defense Planning Guidance

National-Level Problems

Defense Planning Guidance

Defense Science Board

Security Agencies

Technology Exploitation

Defense Science Board

JASONs

Univ. Research Results

Nat'l Acad of Sciences

Office of S & T Policy

Program Selection



- **DARPA's primary mission is to effect Revolutionary Change**
- **Applications or extensions of existing technology are rarely if ever approved for DARPA funding**
- **There is no set funding level or percentage for any focus area**
- **DARPA programming is bottom-up**
- **DARPA Management evaluates:**
 - **Program goals and objectives**
 - **Program structure and content**
 - **Whether a program concept represents a Revolutionary versus Evolutionary change**

Fundamental Changes



- **Proliferation of previously controlled technologies**
 - Probable deployment of missile defense capability
- **Global emergence of new, threatening technologies**
 - DoD S&T must catch-up to rest of world
 - DoD S&T must interface with existing civilian infrastructure
- **Global availability of technology for command & control infrastructure**
 - DoD S&T must react to unanticipated developments

Many of the technologies that can deal with these changes are not controlled by DoD nor can DoD manage the pace of development

Current Science & Technology Process



- **DoD S&T investment and management is focused inward**
 - Policy and planning primarily oriented towards internally subsidized investments
 - Presumes knowledge and control of all critical technologies
 - Sub-critically funded
 - Budget constraints often result in “PowerPoint S&T programs”
 - Limited intellectual gene pool

Fragmented, stove-piped S&T investment and management paradigm wastes already scarce resources

A Proposed S&T Investment Strategy



- DoD cannot expect to
 - Completely control where, when and how future defense critical technologies will emerge
 - Have ample warning of the application of emerging technologies to national security threats
- DoD must
 - Understand global technologies
 - Move faster than our enemies to exploit opportunities and counter threats
- DoD S&T must
 - Advance military-unique technology to maintain excellence
 - Provide global understanding and rapidly react to unanticipated change

DoD S&T is at the intersection of military-unique and other global technology changes, with investment resources to provide access to these changes

DoD needs a Chief Technology Officer!



- **Exceptional grasp of global technology**
- **Has direction authority over all DoD S&T resources**
- **Is Secretary's focal point for technologies needed to enable force transformation**
- **Is major interface with JCS on technical matters**
- **Is major DoD interface with other Federal, state and local agencies**
- **Advises Secretary of emerging technologies and policies, plans and programs to use S&T resources to leverage these technologies**

DoD CTO will elevate importance of S&T and attract top-notch people to public service

Summary



- **Major changes in national security environment will be driven by globally available technology**
- **These require a major change in the DoD S&T investment and management model**
 - **Focus on both requirements and technology opportunity**
 - **Elevate role of technology in DoD**
- **DARPA can help lead this change**